



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/587,612	06/05/2000	Satoru Furuta	192324US2	8855

22850 7590 08/06/2003

OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.
1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER

MICHALSKI, JUSTIN I

ART UNIT	PAPER NUMBER
----------	--------------

2644

DATE MAILED: 08/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/587,612	Applicant(s) FURUTA, SATORU	
	Examiner Justin Michalski	Art Unit 2644	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06/05/2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
 If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☒ All b) ☐ Some * c) ☐ None of:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>4,5</u> . | 6) <input type="checkbox"/> Other: |

DETAILED ACTION

Information Disclosure Statement

1. IDS papers No. 6 and 7 are objected to due to no PTO 1449 being submitted.

Serial Numbers 10/343,744 and 10/276,292 are not available and not considered.

Specification

2. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 1, 2, 4, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mauro et al. (US Patent 6,233,549) in view of Itoh et al. (US Patent 5,757,937).

Mauro et al. discloses a noise suppression device (Fig. 2) comprising: a time to frequency converter (transform element 204) for performing frequency analyzation of an input time domain signal for conversion to an amplitude spectrum; a circuit for obtaining a noise spectrum from the input signal (reference 241a), a circuit for obtaining a signal to noise ratio from the amplitude spectrum and the noise spectrum (reference 210a), a perceptual weight control circuit (reference 220b) for controlling based on the signal to noise ratio (input from 210b) first and second perceptual weights for use in performing perceptual weighting in accordance with spectra (inputs from 204, 205, and 220a); a spectrum amplitude suppressor (reference 224) for multiplying a spectrum obtained from a circuit by the second perceptual weight as controlled by said perceptual weight control circuit, and a frequency to time converter (reference 226) circuit for converting an output of said spectrum suppressor circuit to a time domain signal. Mauro et al. does not disclose a spectrum subtractor directly subtracting a product of said noise spectrum and the first perceptual weight from amplitude spectrum. Itoh et al. discloses subtracting circuit (Fig 2. reference 34) which multiplies the noise spectrum by a weighting coefficient (i.e. controlled by perceptual weight) and subtracts the acoustically weighted noise spectrum (input from reference 33) from the spectrum of the input signal (input from reference 31). Itoh et al. teaches since background noise is mostly stationary noise, the noise power spectrum can be subtracted from an input signal to suppress the noise in the output signal (Column 1, lines 57-65) Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to

subtract the noise spectrum from an input spectrum in order to suppress noise for a cleaner output signal.

Regarding Claim 2, Mauro et al. further discloses that the signal to noise ratio will be used to compute (i.e. vary) the level of attenuation (i.e. perceptual weight) of the input signal for noise suppression (Column 6, lines 60-62). Therefore the perceptual weights can be varied smaller or larger as the signal to noise ratio changes.

Regarding Claim 4, Mauro et al. further discloses a circuit that determines the gain (i.e. modifies perceptual weights), and thus the level of noise suppression for the input signal. If speech is not present, then the gain is set at a predetermined minimum gain level (i.e. weights based on whether an input signal is a noise or audio component) (Column 9, lines 14-20).

Regarding Claim 10, Mauro et al. further discloses that if speech is not present the gain is set at a predetermined minimum gain level (i.e. externally selected) (Column 9, lines 16-20).

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Mauro et al. and Itoh et al. as applied to claim 1 above, and further in view of Vilmur et al. (US Patent 4,811,404). The combination of Mauro et al. and Itoh et al. make obvious all elements of claim 1. Mauro et al. and Itoh et al. do not disclose a weight modifier for modifying weights as a ratio of high to low frequency. Vilmur et al. teaches suppressing the noise of an input spectrum by allowing low frequency noise channels have a minimum gain value of -13.1 dB while the upper frequency channels

have a minimum gain value of -20.7 dB (i.e. ratio of low and upper frequencies) resulting in less voice quality degradation (Column 8, lines 18-23). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the weight or gain based on a ratio of high to low frequency in order to reduce the voice quality degradation.

6. Claim 5, 6, 8, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Mauro et al. and Itoh et al. as applied to claim 1 above, and further in view of Crozier et al. (US Patent 5,742,927). The combination of Mauro et al. and Itoh et al. make obvious all elements of claim 1. Mauro et al. and Itoh et al. do not disclose a third perceptual weight for negative or zero values of spectrum subtraction. Crozier et al. discloses a scaling factor α where any resulting negative terms are set to zero and non zero minimum power levels are defined (i.e. fill-up-processing) (Column 3, lines 41-51). Crozier et al. teaches that a non zero minimum power level may reduce the effect of musical noise (Column 3, lines 41-51). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a weight for fill-up-processing when the subtracted difference is negative or zero in order to avoid unwanted noise in the output signal.

Regarding Claim 6, Itoh et al. further discloses an input signal amplitude spectrum (output of 31 to 34), noise spectrum (output of 33 to 34), and an average noise spectrum (output of 33) (Column 5, lines 2-5). Mauro et al. further discloses energy estimator (reference 206B) which generates estimates of the transformed signal

by smoothing the channel energy over the previous frames (i.e. average of input signal spectrum) (Column 4, lines 36-41).

Regarding Claim 8, Mauro et al. further discloses a signal to noise ratio output (output of 210B) which is used to control gain (i.e. a perceptual weight).

Regarding Claim 9, Mauro et al discloses a signal to noise estimator 210B which delivers a weighted output based on the ratio of input signal amplitude stored in 206B and the smoothed (i.e. average) noise energy from 214B.

7. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Mauro et al., Itoh et al., and Crozier et al. as applied to claim 5 above, and further in view of Vilmur et al. (US Patent 4,811,404). The combination of Mauro et al., Itoh et al., and Crozier et al. do not disclose the use of modifying gain as a ratio of high to low frequency power. Vilmur et al. teaches suppressing the noise of an input spectrum by allowing low frequency noise channels have a minimum gain value of –13.1 dB while the upper frequency channels have a minimum gain value of –20.7 dB (i.e. ratio of low and upper frequencies) resulting in less voice quality degradation (Column 8, lines 18-23). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the weight or gain based on a ratio of high to low frequency in order to reduce the voice quality degradation.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Chan et al. (US Patent 5,812,970). Chan et al. discloses a method for reducing noise in a speech signal using spectral adjustments.

Mauro (US Patent 6,122,384). Mauro discloses a noise suppression system and method by spectral subtraction.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Justin Michalski whose telephone number is (703)305-5598. The examiner can normally be reached on 8 Hours, 5 day/week.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Forester Isen can be reached on (703)305-4386. The fax phone numbers for the organization where this application or proceeding is assigned are (703)872-9314 for regular communications and (703)872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-3900.

JM
July 30, 2003


XU MEI
PRIMARY EXAMINER